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RATE STABILIZATION EFFECTIVENESS AT PWC SAN DIEGO

Henry John Schwirtz

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

Rate Stabilization Effectiveness
at PWC San Diego

by

Henry John Schwirtz
and
Joseph Francis Mullane, Jr.

September 1977

Thesis Advisor: J. C. Tibbitts

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The thesis (1) explores the policy of rate stabilization with its advantages and disadvantages, (2) attempts to determine whether budgeting is more effective using rate stabilization

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RATE STABILIZATION EFFECTIVENESS AT PWC SAN DIEGO

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ABSTRACT

Since 1 July 1975, Public Works Centers (PWC's) have billed their industrial fund customers on the basis of stabilized rates. The effectiveness of this rate stabilization is addressed using PWC San Diego as the model activity.

The thesis (1) explores the policy of rate stabilization with its advantages and disadvantages, (2) attempts to determine whether budgeting is more effective using rate stabilization rather than previous methods and (3) assesses the impact of rate stabilization on PWC management. The authors conclude that the benefits of rate stabilization far outweigh its shortcomings by providing significant management incentives and a better system for budgeting. Sources of information include official correspondence and reports and interviews at DoD, NAVCOMPT, NAVFAC, PWC San Diego and its customer activities.

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I. RESEARCH PROBLEM

A. INTRODUCTION

Within the Navy's industrial complex lies control of the readiness of fleet operating and support units. In the Navy's budget each year, funds are programmed to overhaul, maintain and repair ships, aircraft and real property, as well as provide normal day-to-day services such as transportation, heat, light and water. All of these maintenance and day-to-day services are provided by the Navy's industrial complex. The ultimate objective of this system is to maintain a predetermined level of material readiness. This level of readiness is greatly affected by the ability of the industrial complex to achieve its mission of accomplishing required work on all programmed units within the funds provided by Congress. [Ref 7]

This thesis addresses the issue of the 'stabilized rate' concept, a method of billing and reimbursement, as utilized by the the Public Works Center (PWC), San Diego, for the Navy community it serves. The San Diego community is of a size adequate to be analyzed by this thesis and PWC San Diego is representative enough of all Public Works Centers to be a surrogate for the entire PWC community.

B. DESCRIPTION OF THE PROBLEM

In the past years, in a climate of stabilized economic conditions, it was a relatively simple matter to determine that a certain number of ships required overhaul during a given fiscal year and that a specific amount of work needed to be done. By applying the rates for services of the industrial activity that would accomplish the work, the total cost of each overhaul was determined and appropriate funds were budgeted and approved by Congress.

As the economic world began to experience rapid inflation aided by various shortages in petroleum and other materials, the industrial activities attempted to keep pace by adjusting their rates upward to cover increased costs. The natural outcome of all this was that appropriated dollars were used up faster than expected and the end result was fewer ships than programmed could be overhauled. This directly affected fleet readiness and proved to be embarrassing to the Navy when dealing with Congress.

While increased costs were not the only reasons for failure to meet overhaul, repair and maintenance program schedules, this problem provided both the Navy Industrial Fund (NIF) activities and customers a simple and understandable excuse that masked other management faults. [Ref 8]

Realizing the futility of achieving any change in the funding system through Congress and the tremendous loss in management control of any attempt to move the industrial activities away from the industrial funding concept, Department of Defense (DoD) managers determined that only two realistic alternatives were available, as follows:

1. Continue to accept cost fluctuations to the appropriated funds and acknowledge that program goals might not be met, or

2. Use the NIF to absorb increases or decreases in costs. [Ref 19]

As originally conceived, the NIF concept recovered all costs of operations on an annual basis. As a start up mechanism, a working capital corpus (or pot of money) was furnished each NIF activity. As the corpus was depleted by paying salaries and other costs, it was replenished by customer payments for purchased services. By using traditional corporation accounting and management techniques, the activity attempted to operate on a break even or zero profit basis by adjusting the rates it charged for services.

Rates changed very little during periods of stable economic conditions as alluded to previously and by nature, the rates were 'stabilized'. From this came the concept for the second alternative, Rate Stabilization. Under this concept industrial activities establish their rates far enough in advance to allow the customers to budget for the next fiscal year's work and these rates are then frozen for that entire fiscal year. Accordingly, an industrial activity has to forecast rates as much as 19 months in the future. If unanticipated cost increases occur, the industrial activity must operate at a loss and this loss is absorbed by the corpus. Furthermore, by the time a gain or loss is realized, the next year's rates have already been set. As a result, the initial year's loss is recovered in the establishment of the third year's rates. In effect, this extends the industrial fund operation from an annual to a triennial basis. [Ref 7,8]

Overall, the policy of stabilizing the rate throughout the budgeting and execution phase should ensure the following:

1. Customer activities obtain the number of units of output planned for in the budget. [Ref 7,8,19,21]

2. Industrial fund managers devote closer attention to the rate development process and management of the overhead accounts. [Ref 19,21]

Given the inherent problems of continuing operations during a period of double digit inflation, high level support for rate stabilization grew. In 1975, DoD issued a mandate that rates for all industrial funded activities would be stabilized during FY 76 and that all customers would be billed on the basis of predetermined rates.

The rate stabilization program was implemented in the Military Sealift Command in 1973, at the Naval Air Rework Facilities (NARF's) on 1 July 1975, and at the Public Works Center (except for direct labor charge) on 1 July 1975. PWC's stabilized direct labor charges on 1 January 1976. All other industrial fund activities implemented rate stabilization on 1 October 1976.

C. THESIS OBJECTIVE

The objective of this thesis is to evaluate the effectiveness of the rate stabilization policy upon the Public Works Center, San Diego, and its customer activities. This will be done by:

1. Determination of the objectives of the stabilized rate policy.

2. Determination/evaluation of the impact upon the planning and budgeting process at the PWC and at the

customer activities.

3. Determination of the impact upon the management and management processes at the PWC and at the customer activities.

D. THESIS APPROACH

The approach was two-phased. First a subjective evaluation of the advantages and disadvantages of rate stabilization to both the NIF manager and the customer activity was made. Then, an objective analysis of budget data was undertaken to determine if better budgeting performance is being achieved from rate stabilization. To accomplish this analysis, budget data from before and after rate stabilization was collected and personal interviews were conducted with representatives of the following activities during the period of May-June 1977:

1. Department of Defense (DoD).
2. Office of the Comptroller of the Navy (NAVCOMPT).
3. Naval Facilities Engineering Command (NAVFAC).
4. PWC San Diego.
5. Customers of the PWC San Diego, such as:
    a. Naval Station, San Diego
    b. Naval Air Station, North Island
    c. Naval Regional Medical Center, San Diego
    d. Naval Amphibious Base, Coronado
    e. Naval Training Center, San Diego
    f. Naval Ocean Systems Center, San Diego.

II. BACKGROUND

A. INTRODUCTION

Public Works Center, San Diego (PWCSD), has been used as a surrogate for all eight of the PWC's. PWC's report to the Chief, Naval Facilities Engineering Command (NAVFAC), via the appropriate Engineering Field Division. Their mission includes the full range of public works services: utilities, facilities maintenance, housing, transportation, engineering services, shore facilities planning support and all other public works support required by operating forces, dependent activities and other commands located at and in the vicinity of the naval complex being served by a PWC. All the above support is provided on a reimbursable basis except for engineering services, which are funded directly by NAVFAC.

The stated policy concerning PWC's is that activities of the Naval Shore Establishment will not duplicate services that are available from existing PWC's and that all activities will maximize the use of the PWC located in their geographical area. [Ref 1]

Customers, therefore, are a captive audience of the PWC and it is incumbent on the PWC managers to provide the most service for the dollar to insure maximum readiness and performance of the Navy's shore establishment. To help achieve this goal, two major management tools have evolved; the Navy Industrial Fund (NIF) concept and Rate

Stabilization at NIF activities.

Sections B through G of this chapter provides a brief outline of the NIF and PWC history and operational procedures, while Sections I, J and K provide a deeper exploration of rate stabilization with its attendant advantages and disadvantages.

B. THE NAVY INDUSTRIAL FUND AND THE NAVY PUBLIC WORKS CENTER

The history of NIF goes back to the National Security Act of 1947 and directly to the TITLE IV amendment to the Act of 1949 which required the Secretary of Defense to establish working capital funds in the Department of Defense. Pursuant to this, the Navy Industrial Fund was established in 1949 under the provisions 10 U.S. Code 2208. [Ref 5] This resulted in token establishment of a few NIF activities, principally the printing stations. Supported by the success of these early conversions and thoroughly strengthened by the recommendation of the Hoover Commission of 1955, many additional conversions were undertaken. Typical other prospects for conversion were ordnance plants, aircraft overhaul and repair facilities, public works centers, naval weapons facilities, the Military Sealift Command and shipyards.

From this meager beginning, NIF activities now do over 6 billion dollars of business each year. The eight Navy Public Works Centers account for over 400 million dollars of the total. It is interesting to note that the success of the PWC's has motivated the Army and Air Force into adopting the industrial funded PWC concept. Their pilot program in this arena is a combined effort that establishes the San

Antonio Real Property Maintenance Agency in the San Antonio, Texas, area. This agency will provide real property maintenance for four Air Force Bases and one Army Fort. [Ref 33]

Operations and accounting procedures of the NIF activities are governed initially by DOD Directive 7410.4. [Ref 1] These regulations are further expanded in the Navy Comptroller Manual [Ref 2] with specific accounting procedures for PWC's contained in the Navy Industrial Fund Handbook, NAVSO P-1718. [Ref 3]

The principle advantages of the NIF activity have been described as providing:

1. More effective means of determining costs for goods and services as a basis for billing customers.

2. More effective and flexible means for financing, budgeting and accounting for operations.

3. Greater sense of responsibility and restraint in the ordering of goods and services based upon availability of funds.

4. More direct and rapid control of the quantity of support activities.

5. A more complete consumption type budget and accounting structure by which costs of goods and services furnished may be budgeted and accounted for under the program or function for which they have an end use. [Ref 4]

C. NIF OPERATIONAL PROCEDURES

Each NIF organization is different depending on its mission; however, each one is built around the central working capital or revolving fund concept. In simple terms, this means that a central fund, i.e., 'corpus' provides working captial to an industrial activity in sufficient amount to finance operations until such time that reimbursements from customers are received. These reimbursements then fund continued operations. Theoretically, once started, the NIF activity should be self generating, i.e., reimbursements cover the cost of operations.

The NIF system utilizes the market system of accounting, i.e., accrual double entry bookkeeping. With the use of this standard method of accounting, the tried and proven concepts of industrial managerial accounting are available for close control of the system. The system makes classical use of ledger accounts, assets, liabilities and equities along with the resulting income statements and balance sheet. The real strength of the NIF system lies in the use of these accounting concepts due to the wealth of management tools that go along with the system.

With any industrial organization, the supply of raw materials to perform the job is critical to its success. Without timely supply support, both costly delays and dissatisfied customers are encountered. To help insure the smooth flow of supplies, most NIF activities will have a Material Department in their organization that performs both the required liaison with the Navy's supply system and direct procurement. The Material Department also accomplishes the inventory function, operates shops stores and follows up on material requisition. The necessity for a good Material Department cannot be over emphasized because of the different type of material support required by a NIF

activity as opposed to a more normal naval activity. Paramount to the success of material support is the supply/NIF organization partnership that must occur. Without this close working relationship, chaos will result.

D. PWC ORGANIZATION AND SERVICES

The PWC's are an essentially civilian operation with military leadership organized along standard guidelines provided by NAVFAC. This means the success of day to day operations lies with the civilian managers and the success of long range goals and customer relations lies with the military managers. Each PWC provides the following services at cost:

1. Facility inspection
2. Facility planning
3. Engineering estimating or services
4. Contracting
5. Emergency or service work
6. Maintenance
7. Repairs
8. Modernization
9. Utility services for fleet units
10. Utility generation or purchase
11. Utility distribution
12. Transportation services
13. Transportation repair
14. Housing operations or services
15. Water front services.

E. PWC COST COLLECTION

The success or failure of any NIF operation rests with its ability to properly collect costs. If improper costs are collected, then improper rates are charged with resultant errors in cost reimbursement. This becomes even more critical under rate stabilization when poor cost determination cannot be corrected by a rate change. Each NIF activity has its own cost accounting system that employs the accrual basis of accounting, double entry bookkeeping and a cost estimating system.

Two important managerial objectives are achieved by a well implemented cost accounting system:

1. The determination of the full cost of the product or service and

2. Management control of cost center operations.

PWC's use a job order costing system wherein each element of direct and indirect cost is collected and increased by an amount of applied overhead. These costs are collected separately for each job and are the basis for billing the customer. Overhead costs are divided into production and general and administrative costs to assist in their control. The PWC NIF handbook provides guidance on collection and development of the various elements of cost. [Ref 3]

F. PWC BUDGETING

Every NIF activity must prepare input to the annual A-11 Budget, which is the DoD budget for all industrial fund activities. This budget fulfills the requirement of keeping the chain of command apprised of NIF operations and provides

a check tc all concerned that the industrial activities are operating within targets.

The PWC's also prepare a financial and operating budget using the same data. It is a plan of expected expenses, income and financial condition for anticipated levels of work. This budget is intended for use as a management tool by the PWC. Besides serving as an operating guide to decide on mix of operations, it also allows management to evaluate performance through variance. No industrial activity can operate successfully unless it has a realistic operating budget. Without one, difficulties would arise when attempting to project rates, manpower requirements, workloads and required physical resources.

The importance of the A-11 Budget cannot be over emphasized. As RADM Travers, the Deputy Director of Budget and Reports, Department of the Navy, stated to all PWC Commanding Officers during a recent corporate management workshop: major claimants receive funds for utilities and other PWC services on the basis of the NIF A-11 Budget which is generated by DoD approved stabilized rates established by NIF activities. Customer activities should complain to major claimants if adequate funds are not received. [Ref 10]

G. PWC JOB ORDER PROCEDURES

1. Emergency/Service Authorization

Emergency/Service (E/S) authorizations are issued to cover jobs requiring up to sixteen (16) man-hours of labor. There is no limitation as to the amount of material which

can be used. However, under NIF regulations, any material over $5 will be direct costed against the customer.

2. Minor Work Authorization

Minor Work Authorizations (MWA's) are orders to the production shops to perform specific items of work requiring no more than eighty (80) man-hours of labor. There is no limit on the amount of material which can be used on a job. MWA's and E/S's are both assigned pre-established customer job order numbers and are serialized for individual identification.

3. Standing Estimated Job Orders

All work of a recurring nature such as janitorial, snow removal, street sweeping, etc. will be authorized by use of a Standing Estimated Job Order. These will be prepared by the Maintenance Control Department and will be funded by the customer each quarter. Standing Estimated Job Orders are not limited as to the amount of labor and material for which they can be written.

4. Specific Job Orders

Any job of a one time nature (non recurring) which exceeds the limits for either an E/S or MWA will be written as a Specific Job Order. Specific Job Orders allow the greatest amount of control since each one is assigned a job number and costs are accumulated on each job individually. Specific Job Orders may be accepted by the Public Works Center and customer as one of two kinds:

a. Cost Reimbursable

When the scope of the job is difficult to define and/or there are many variables, a Specific Job Order will be written and accepted on a cost reimbursable basis. In these cases, the customer agrees to pay the full costs of the job even when they exceed the original estimate.

b. Fixed Price Agreements

Certain kinds of jobs can be so accurately estimated that the PWC and customers will accept the job on a fixed price basis. On these jobs, assuming the job is funded before the estimate has become outdated and that the scope of the job does not change, the customer pays the originally agreed upon price.

Job orders are normally funded prior to the commencement of work with the exception of the standing estimated job order which is usually funded quarterly, in advance. The only exception to this occurs when the Commanding Officer of the PWC issues a Commander's Order to perform the work. This happens under certain "emergency" conditions whereby the customer provides a written promise to forward funds to the PWC.

Billing of the customers occurs at regular intervals. Billing periods longer than monthly are rare because this requires too much working capital to sustain operations and the customer needs current information as to his financial condition. Shorter than monthly billings are also rare because additional billings require more PWC overhead, i.e. more clerks or overtime. However, shorter

billing periods are allowable if the local corpus is depleted and requires early reimbursement.

H. PWC CUSTOMER RELATIONS

No matter how it is done, each NIF activity must establish a system of customer liaison that will bridge the gulf of misunderstanding surrounding NIF operations. This system cannot be solely a Commanding Officer's problem or as in the case of a PWC, the Activity Civil Engineer's (ACE's) problem. For success, it will require the support of every NIF activity employee from laborer to the engineer. It is no different than a private organization selling a product. The PWC ACE is the middleman for successful liasion. He is normally a military officer who can relate to customer problems and is assigned a billet in the PWC organization. From this vantage point, he submits customers work requests, insures follow up, insures proper funding, provides material status and does anything else required to keep the customer satisfied.

I. RATE STABILIZATION

As a result of favorable top management analysis, implementation of rate stabilization commenced on 1 July 1975 for all DoD industrial funded activities. [Ref 9] The justification for implementation of rate stabilization was basically to give customers of industrial fund activities a firm price for goods and services that would not change in the course of a budget year, thereby allowing the customer to achieve his planned program. The essence of this concept was set forth by an Assistant Secretary of Defense

(Comptroller) memo to the Assistant Secretary of the Navy (FM) dated 4 August 1975 which said,

> "Rate stabilization means that each activity will establish a set of fixed rates based on its approved budget. The rates will be used to bill all customers for the goods and services they receive from July 1, 1975, thru September 30, 1976. The rates may be expressed as costs per manhour; manday; unit of outout; unit of input; or any other manner which best suits the nature of the effort. An activity may have as many rates as is warranted by its organizational structure and by its diversity of workload. The rates will encompass all overhead costs, labor acceleration, direct labor and direct materials. . .A waiver of the requirement to include direct materials in the rate structure may be requested if material usage is both unpredictable and not adaptable to the type of standard pricing techniques now employed by Defense stock funds. . .Fund activities should begin immediately to set up such a system and to adjust their charges to customers accordingly. If conversion of ADP systems is a delaying factor, bills should be prepared by hand until the new ADP programs are put into operation." [Ref 9]

A waiver exempting direct material from the rate stabilization program was granted for PWC's.

The mechanics of rate stabilization are relatively simple. Seven to nine months prior to the commencement of a given fiscal year, the industrial activity publishes a rate schedule for services it provides. Once established, this rate schedule cannot be changed by the industrial activity during the course of the fiscal year. The customer activities then use this schedule to prepare their budget for the fiscal year. If the customer receives all the dollars he budgeted for, then he can buy all the services planned because the cost of these services is fixed. If the customer does not receive all the dollars budgeted, as is generally the case, he can effectively manage knowing the cost of various services will not be changed during the course of the year.

Under the industrial funding concept an activity manager provides a service to his customer, then bills the customer.

The activity manager uses his corpus to pay his expenses incurred, and the customers' payments reimburse the corpus. Prior to rate stabilization, the manager could control his various rates throughout the year so as to adjust his accounts to a zero year-end balance. After rate stabilization, the NIF manager must now absorb any cost fluctuations within the corpus, establishing a break-even planning horizon for three years in the future. Since the customer rates established in the budget preparation phase are the ones that must be used during the execution phase, the activity manager must closely scrutinize all factors and forces which may in any way affect his costs during this future phase.

J. ADVANTAGES OF RATE STABILIZATION

Advantages can be summarized from the points of view of the Navy (in general), the customer activity and the industrial activity.

1. Navy in General

The initial and overriding advantage of rate stabilization is that, with all other factors held constant, the Navy can plan and budget into the future, knowing that the services budgeted for can be accomplished if the dollars are authorized by Congress for these services. This, then, allows achievements of advertised levels of readiness both in fleet ships and aircraft and real property maintenance. These two factors, program achievement and fleet readiness, were expressed best by RADM Travers when he said,

> "It permits the customer to achieve his budgeted program which was developed in large measure based upon certain operational commitments levied on him by National Authorities." .... "The program provides 'the Navy' a management capability heretofore unavailable to effectively and efficiently plan the depot maintenance workload." [Ref 7]

As a result, rate stabilization allows the Navy to maintain an infinitely improved image before Congress. It is no longer necessary to justify cost increases and inflationary pressures to Congress in order to explain failures in achieving program objectives. [Ref 19]

2. Industrial Fund Activity Customers

The advantage to the customer is the same as the advantage to the Navy. On the micro level each individual activity desires to achieve its planned program. It does not desire to see precious maintenance funds devoured by rate increases in utilities. Additionally, knowing that rates are stabilized removes much of the guess work from budgeting. [Ref 27]

3. Industrial Funded Activities

Advantages to NIF activities are identified by several quotes from RADM Travers as follows:

> "Industrial activities will now be committed to a stable financial plan for the entire year with respect to revenues and expenses....their execution can be measured against this stable financial plan to determine variances and, more importantly, the reasons for those variances....Increased productivity at our industrial activities by virtue of the new program stability." [Ref 7]

With rate stabilization the cost estimating rate, in

effect, becomes the billing rate. Therefore, the best financial management talent available will be concentrated in the budget (rate estimating) branch. Under the previous system the best personnel were collecting costs, which is not very exciting and did nothing to stimulate better management. [Ref 21]

Under the previous system, customers were billed and costs collected on actual work performance, i.e., actual hours worked and the only way to measure productvity was to laboriously determine variances of actual costs versus planned costs. Now that the estimating rate is the billing rate, productivity becomes a direct measurement and determines whether gains or losses are generated. [Ref 21]

Rate stabilization will provide new management incentives to the NIF managers. It will require additional long range planning and adherence to planned operating budgets. When faced with these facts, better management thinking and reduced overhead costs should result. Management attention will also be directed to the market place where the NIF manager will now analyze carefully both the supply and demand of his product. [Ref 21]

K. DISADVANTAGES OF RATE STABILIZATION

Disadvantages can be summarized from the same points of view.

1. Navy In General

As a program devised and sponsored by top management, no major disadvantages to the Navy are alluded

to by any factions concerned with rate stabilization. In depth research by the authors also failed to identify any disadvantages to overall Navy objectives. Caution must be excercised, however, by the Department of the Navy (DoN) industrial fund managers to preclude the depletion of the corpus Navy wide. Sufficient safeguards exist in the reporting structure to alert managers of dangerously low corpus levels. However, on a Navy wide basis, it is expected that gains or losses from the aggregated NIF activities will balance out. DoN managers must be able, nevertheless, to recognize adverse trends in the corpus and be prepared to implement corrective actions.

2. Industrial Fund Activity Customers

The disadvantage of rate stabilization to customers results from NIF managers inherent thinking that profit is better than loss. As a result, NIF managers will probably tend to be conservative in developing future rates, resulting in a possible disadvantage to the customer of opportunities foregone. In other words, dollars budgeted for and received by the customers could go into NIF activity profits through conservative rates, rather than achieving their intended purpose of overhaul, repair and maintenance. [Ref 23]

3. Industrial Fund Activities

One of the biggest disadvantages of rate stabilization to the NIF activity is the requirement for the NIF manager to rethink his corporate attitude. The NIF system was originally established to take advantage of time tested private industry management principles. Since adjustment of rates in response to cost increases is the

standard business approach, rate stabilization goes against the NIF manager's training. [Ref 21]

Because of the three year time cycle of rate stabilization, any positive management actions taken by a NIF activity Commanding Officer will not generally be realized during his tour of duty. Therefore, the basic psychological incentive of seeing the fruits of one's labors is removed. [Ref 21,23]

Another disadvantage that must be considered is the retraining required of industrial fund financial managers to think in terms of long range planning. No longer can the activity comptrollers think in terms of quarter to quarter planning to achieve zero profit, rather, they must look up to three years in the future. [Ref 21]

A specific problem to the Public Works Center (PWC) NIF manager is the extreme difficulty of forecasting many different customer requirements. Ship and aircraft overhauls are determined at system command headquarters levels well enough in advance to allow realistic planning. Conversely, the PWC Commanding Officer must deal with many different types of customers from air stations to commissaries, and ship-to-shore utilities to Area Audit Service light bills. As the PWC customer activities change, so does the area of maintenance concentration, making long range (three year) planning extremely difficult. [Ref 23]

III. BUDGETARY IMPLICATIONS OF THE RATE STABILIZATION PROGRAM

A. INTRODUCTION

A principal stated objective of the rate stabilization program was to improve the budgeting ability of both the customers and the managers of industrial funded activities. [Ref 7] If the rate stabilization program is to accomplish this and enable the customer activities to budget more effectively, it must be shown that the budget data is developed with a firm knowledge of the number of units of output required through the course of the year.

This Chapter will review the data available from the PWC, San Diego, to evaluate the effectiveness of the budgeting process. The PWC budget, in this respect, will be considered as a surrogate for the aggregated customer activities of the PWC. This is a valid assumption, in that the PWC must consider the requirements of all its various customers in its evaluation of anticipated revenues and development of overhead charges, and to ensure sufficient resources are available to support the total requirements. [Ref 21]

B. IDENTIFICATION OF MEASURABLE DATA

In order to objectively review the budgeting ability of

an activity, a comparison must be made between the amount of funds budgeted and the funds expended, as well as a comparison between the distinct goods and services planned (budgeted) and the amount actually consumed or utilized. The PWC San Diego provides a myriad of services to its customers. References 11 through 18 and 21 indicate that many of these services are readily identified with a discrete measurement of output. However, in many cases, charges to customers are based upon input (resources consumed), rather than upon output realized. The following is a review of each of the major service categories provided by the PWC, to demonstrate whether or not it lends itself to a discrete output analysis.

1. Overhaul, Repair and Renovation Services

Although this category is a significant portion of the customers' budgeted dollars, it does not lend itself to a discrete output measurement. Costs are figured on the number of direct labor hours required and charges are made on the number of direct labor hours provided. Reviewing the budgets and operating statements [Ref 11 through 18] and through interviews [Ref 21], it has been determined that there is no direct relationship between the number of direct labor hours provided in support of an activity and any discrete output. Similar jobs may be found to require significantly different numbers of direct labor hours depending upon many factors, such as working conditions, distance from the center and other relevant factors. Therefore, items budgeted in this category will not be evaluated in the budgetary implications but will be addressed in Chapter IV as part of the management implications.

2. Transportation Services

The PWC operates all Navy motor transport in the San Diego area and leases the vehicles to its customers. Lease charges are computed on an aggregate of time, mileage, maintenance required and type of vehicle. Since the PWC and customer activities do not discretely identify the source of costs as to mileage or other factors, discrete comparison of budget to execution in this area cannot be made. [Ref 11 through 18]

3. Utility Services

The PWC acts as a central clearing house for all light, heat, water and power requirements to its customer activities. The PWC either purchases or manufactures the specific utility and distributes it to customers. It is in this area that discrete units of output may be identified. The budget of the PWC identifies certain requirements for steam, electricity, water, gas, etc. in discrete units of measurement and identifies a proposed total cost or revenue for each category. [Ref 11, 12, 13, 14] Reliable determination of the budget units is necessary in order to accurately reflect the overhead charges which are to be levied for the utility provided. Further, end-of-year operating reports of the PWC reflect the number of units actually delivered to, or consumed by, its customers during the reporting period and the actual charges made for those quantities. [Ref 15, 16, 17, 18]

Inasmuch as utilities is the only category which provides this discrete input/output measurement, utilities will be used to analyze the budgetary implications of the rate stabilization program.

UTILITY SERVICE	APPROX PCT OF BUDGET	QUANTITY PLANNING			DOLLAR BUDGETING		
		FY 1975	FY 1976	FY 197T	FY 1975	FY 1976	FY 197T
Electricity (AC)	55%	8.2%	13.4%	0.9%	1.6%	12.8%	0.4%
Steam	25%	6.1%	2.3%	0.1%	9.1%	2.9%	0.3%
Water (Fresh)	8%	10.6%	23.1%	6.1%	3.8%	21.1%	3.1%
Sewage Disposal	3%	7.8%	24.5%	6.5%	5.2%	23.6%	6.0%
Small Heat Plants	3%	18.6%	1.2%	0.5%	16.0%	3.7%	2.2%
Gas	2%	10.3%	10.3%	14.5%	12.2%	12.2%	17.3%
Compressed Air	2%	6.6%	0.6%	59.8%	10.7%	1.9%	58.8%
Water (Salt)	1%	15.2%	12.2%	15.8%	15.2%	12.1%	15.8%
Electricity (DC)	1%	1.7%	14.7%	4.8%	1.3%	14.7%	4.8%

NOTE: The smaller the percentage, the closer the actual results were to the planned figure and the better the planning.

Figure 1 - CUSTOMER BUDGET EFFECTIVENESS BY UTILITY SERVICE AT PWC SAN DIEGO

C. IMPACT UPON CUSTOMER BUDGETING

Figure 1 identifies the major utility services provided by the PWC to its customers. The data in Figure 1, extracted from references 11 through 18, has been analyzed for FY 75, FY 76, and FY 7T. FY 75 represents the last full year without rate stabilization. While FY 7T was only one quarter, the trends of improvement should be noticeable. The data presented are percentages by which the end-of-year totals differed from the amount budgeted, so as to remove any prejudice which may be ascribed to end-of-year figures being over or under the budgeted amount. The data are presented for the discrete units of utility service as well as the dollar amounts, so both requirements determination and the costing of those requirements may be observed.

Appendix A provides a more detailed analysis and display of data than presented in this chapter. The analysis in the appendix, however, is limited due to the unavailability of budgeted data for portions of FY 77. The data is displayed as the actual units and actual dollar requirements, both budgeted and expended. The appendix then evaluates the data in a unique fashion to develop an overall budget effectiveness 'index' for each fiscal year. The index represents the percentage of deviation that the actual end-of-year results were of the budgeted figures. This concept, as presented in Appendix A, should prove valuable to compare FY 77 with the previous years, as well as using the index to compare other future years. Further, in that the index considers all the various factors involved with budgeting and planning effectiveness, it is proposed as a standard to be used in comparing the budgeting efforts of one year with those of another year. The indices for FY 75,

FY 76 and FY 7T are displayed below:

YEAR	DEVIATION FROM BUDGET	
FY 1975	6.47%	
FY 1976	10.94%	(rate stabilized)
FY 197T	2.20%	(rate stabilized)

The extreme change in water and sewage in FY 76 may be somewhat attributed to a program of correcting water meters, which led to an increase in measured volume. When combined with an unexplained heavy demand, a significant deviation from the planned amount occurred. [Ref 16]

The FY 7T deviation in compressed air reflected an increased demand caused by a high volume of ships in port. [Ref 17] Other than the above exceptions, the ranges of variances were fairly similar during the three years demonstrating no improvement in the ability to forecast quantities.

However, an interesting observation may be made by comparing resources predicted to dollars budgeted. There is no apparent direct relationship in the FY 75 quantity to dollar variances, in that while AC electricity usage deviated by 8.2%, the customers' costs deviated by only 1.6% and while steam usage deviated by 6.1%, the customers' costs deviated by 13.4%. Comparing FY 76 and 7T quantities to dollars, however, a direct relationship may be observed. This direct relationship of usage to costs would appear to permit customer activity commanders to more effectively manage resources during the execution of the budget. Accordingly, while rate stabilization has not provided customer activities a means to better predict resource requirements, it has enabled them to more accurately predict the financial impact of various courses of action.

D. IMPACT UPON PWC BUDGETING

By requiring the NIF activity to establish its rates as much as 19 months in advance of the beginning of the year, rate stabilization issues a significant challenge to the predictive abilities of the NIF activity managers. The following demonstrates the difficulty of this prediction task.

In late 1975 and early 1976, the PWC San Diego conferred with the management of the San Diego Gas and Electric Company to determine what rate structure the company anticipated during FY 77. In addition, federal government representatives attended California State Public Utilities Commission hearings on rate adjustment requests by the San Diego Gas and Electric Company. Other relevant factors considered while predicting rates included renovations required to the PWC electrical distribution system, anticipated wage scales for FY 77, overhead allocation rates and the estimated amount of electricity that would be bought. These factors and others were pieced together to establish an estimated cost to the PWC of $66.00 per million kilowatt hour (mkwh). However, as FY 77 began, many planned rate adjustments were not approved by the PUC and rebates for prior charges were made by the company. As a result, the PWC, San Diego, has found its costs for AC electricity to be considerably less than expected during FY 77 to date. This variance is shown in Figure 2. [Ref 23, 24, 25]

UTILITY SERVICE	APPROX PCT OF BUDGET	FY 1975 UNIT COST			FY 1976 UNIT COST			FY 197T UNIT COST			FY 1977 UNIT COST		
		BUDGET	ACTUAL	% DIFF	BUDGET	ACTUAL	% DIFF	BUDGET	ACTUAL	% DIFF	BUDGET	ACTUAL	% DIFF
Electricity (AC)	55%	$28.25	$26.64	5.7%	$33.00	$36.84	11.6%	$42.75	$40.66	4.9%	$50.39	$41.36	17.9%
Steam	25%	3.05	2.81	7.9	3.40	3.53	3.8	4.42	4.30	2.7	5.52	5.06	8.4
Water (Fresh)	8%	.76	.78	2.6	.90	.86	4.4	.83	.87	4.8	.89	.81	9.0
Sewage Disposal	3%	.65	.49	24.6	.65	.61	6.2	.62	.58	6.5	.75	.58	22.7
Small Heat Plants	3%	5.65	4.21	25.5	5.75	4.79	17.2	9.06	7.07	22.0	7.06	6.77	4.0
Gas	2%	1.75	1.27	27.4	2.10	2.16	2.9	2.69	3.09	14.9	3.47	2.38	31.4
Compressed Air	2%	.46	.50	8.7	.50	.40	4.0	.81	.39	57.1	.62	.42	32.3
Water (Salt)	1%	.25	.22	12.0	.32	.36	12.5	.54	.50	7.4	.61	.73	19.7
Electricity (DC)	1%	62.50	52.56	15.9	66.00	70.32	6.4	96.00	79.44	17.3	125.00	91.97	26.4

Figure 2 - UNIT COST VARIANCES, UTILITY SERVICES, PWC SAN DIEGO

In addition, Figure 2 displays an analysis of costs to the PWC for other utility services for FY 75, FY 76, FY 7T and FY 77 through March 1977. In that the amount of the utility purchased or provided is a factor in determining total costs, the cost to the PWC per unit of the utility is displayed. Costs for each fiscal year are analyzed as budgeted or predicted cost per unit and actual cost per unit and the percentage variance is shown. The data shown have been computed from references 11 through 18.

In FY 75, prior to rate stabilization, any cost adjustments could be passed on to the customers so as to minimize the effect upon the NIF corpus. During that year, cost variances ranged from 2.6% to 27.4%. In all areas, except fresh water and compressed air (or about 10% of the total budget), actual costs were less than predicted resulting in savings passed on to the customers.

In FY 76, with the implementation of rate stabilization, problems occurred in the cost structure. While the variances were less volatile than FY 75, ranging from 2.9% to 17.2%, the directions were changed. Approximately 84% of the budget experienced cost increases, representing operating losses to the PWC of approximately one and a quarter million dollars which had to be absorbed by the corpus. [Ref 16]

FY 197T results, with the exception of compressed air, differed from budgeted figures by 2.7% to 22.0%. In all cases, except fresh water, actual costs were less than predicted. Under normal circumstances, this would have represented a gain to the corpus. However, as part of the implementation program of rate stabilization, customer charges were levied at FY 76 rates. [Ref 12] Comparing FY 76 budgeted cost to FY 7T actual costs, it may be observed

that in most cases significant increases were experienced. AC electricity increases alone were 23%. Thus, due to the unusual situation, the PWC corpus experienced another loss. [Ref 17]

FY 77 actual costs for the first six months of operation do not include adjustments charged the customer to offset the losses of prior years, so that rates charged to the PWC, as shown in Figure 2, are different from those charged the customers. The variances are more volatile than the three previous years, ranging from 4.0% to 32.3%. In almost all cases, actual costs were less than predicted. This resulted in a significant gain to the corpus and resulted in an unprecedented mid-year rate adjustment approved by DoD. [Ref 24]

The purpose of Figure 2 is to display a measure of the success to date of the PWC at predicting costs. While the data are not sufficient to draw significant conclusions, a conservative attitude may be noted whereby the PWC anticipates the costs to be greater than actually occur. Of the 36 rates analyzed, 26 rates were actually less than predicted, with 7 of 9 lower in FY 75, 4 of 9 lower in FY 76, 7 of 9 lower in FY 77 and 8 of 9 lower in FY 77. This attitude toward conservatism is attributable to both the stigma attached to financial reports which show a loss to the corpus and to the need to turn over the corpus approximately 30 times a year. [Ref 21, 23, 24]

E. SUMMARY

The analysis presented in this Chapter (and in Appendix A from limited data available) demonstrates that the rate stabilization program has met the goal of enabling the

customer activities to budget better for purchased services. However, it does have deleterious effects upon the NIF corpus, causing the corpus to fluctuate from year to year, absorbing the variances.

IV. MANAGEMENT IMPACT FROM RATE STABILIZATION

A. INTRODUCTION

The initial impact of rate stabilization on NIF management was traumatic due, in most part, to lack of understanding by all concerned. This initial trauma could have been lessened, had time permitted the following of proven guidelines for new system design and installation. These guidelines are set forth by Dr. Robert Anthony and Regina Herzlinger in chapter 13 of their text Management Control In Non Profit Organizations. [Ref 6] These guidelines are summarized below:

1. PLANNING. Develop a plan for system design and installation, including a timetable and as careful a statement of responsibilities as is feasible.

2. ANALYSIS OF OBJECTIVES AND ORGANIZATION. Diagnose the objectives of the organization, the existing control system and the existing organization structure. This analysis may reveal defects in the existing system and organization structure, in part reflecting differences between the real objectives and the objectives as they are perceived by the organization. It may lead to a reorganization.

3. INVENTORY OF CURRENT INFORMATION. Examine the existing sources of information.

4. DEVELOP THE CONTROL STRUCTURE.

5. DEVELOP PROCEDURES.

6. TEST. Test the proposed structure and procedures, preferably in one part of the organization. This provides a concrete example which is essential in educating people as to what the new system is all about.

7. EDUCATION. Develop and implement an educational program.

8. IMPLEMENTATION. If feasible, run all or part of the new system concurrently with the existing system. As soon as feasible, eliminate all obsolete parts of the existing system. [Ref 6]

Due to the severe impact of double digit inflation, DoD management chose to implement rate stabilization quickly, which resulted in insufficient preparation and lack of time for proper testing and evaluation of users. Rather than implementing rate stabilization across the broad spectrum of all NIF activities, it would have been better to provide for a gradual build-up using valuable lessons learned along the way.

A good topic for follow-on analysis would be to compare the way in which rate stabilization was implemented with the text-book method.

However, in spite of its poor start, many strong management tools afforded by rate stabilization have now taken hold. Research interviews indicate strong acceptance by both the PWC and its customers. The following sections of this chapter will explore management impact on the princpal players of the rate stabilization game. The method

for evaluating management impact was done in the form of personal interviews at the various levels of management from DoD to PWC San Diego customers. These interviews were conducted jointly by the authors on two separate trips, one to the Washington, D. C. area and one to the San Diego area. All interviews used predetermined questions, followed by a general discussion of the operating experiences to date. As each management point is covered a reference will be cited at the end of the paragraph to indicate what interview produced that particular point. No attempt is made to cite specific quotes, but rather to extract the critical information contained in each interview.

B. IMPACT ON DOD

Rate stabilization has given DoD personnel an interesting private industry management tool in the form of a pricing policy. In the formulation of each fiscal year's guidance to NIF activities, DoD can now make a survey of the nation's major economic indicators and come up with a pricing factor for each NIF activity to apply to its rates. This is a dangerous evolution because of the many factors that affect any type of economic predicting but the strategy provides the opportunity to include inflation and other cost pressures in future budgets. [Ref 19] The chief management tool afforded to DoD is, however, that rate stabilization assures the approving authority that if they authorize a spending program, it will get accomplished providing other non-financial factors remain stable. [Ref 19] Because of this benefit, DoD's dealings with Congress are made infinitely easier. DoD is no longer placed in the untenable position of either not achieving planned programs or asking for more dollars because of increased cost of doing business.

Under current DoD dictates, gains or losses will not be recovered only by the activity incurring them, instead the gains or losses will be prorated uniformly over the entire NIF activity group, such as all PWC's, all Shipyards, all NARF's, etc. For example, if a PWC losses 8 millon dollars during a given fiscal year, this loss will be recovered in the third year by all eight PWC's, not just that one PWC. The fallacy is that this policy minimizes management incentive to improve its individual performance. [Ref 21]

Rationale by DoD in support of this uniform distribution of gains and losses is to avoid lower rates at one activity that might attract customers from an activity attempting to recoup prior losses. [Ref 19] This is not a factor for PWC customers since they are bound by regulation to use their geographical PWC for services. [Ref 1]

Physical restrictions, availability of skilled workers and work force grievances preclude any great redistribution of the overall NARF and shipyard workload.

C. IMPACT ON THE COMPTROLLER OF THE NAVY

NAVCOMPT feels that rate stabilization's most important impact is that it protects the customer's budget, with any perturbations occurring during a fiscal year absorbed by the NIF corpus and not the customer's budget. [Ref 20]

Another benefit perceived by NAVCOMPT is the inability of a NIF activity to adjust its rates prior to commencement of a new fiscal year, thereby taxing the customer for dollars he had no chance to budget for. [Ref 24]

It is also felt by NAVCOMPT that rate stabilization

forces improved planning within a NIF activity. This is caused by the need to explain variances and take immediate management action to bring them back into line. [Ref 20]

With the NIF corpus now absorbing budget perturbations, NAVCOMPT notes that increased attention is being focused on NIF activity by Navy's top management which brings added pressure on NIF managers to do well. [Ref 20]

NAVCOMPT sees rate stabilization bringing about increased efficiency in NIF operations through better projections of future workload. In the past, a NIF activity would plan for a certain level of production and then see this level decrease because of inflation. The new workers or machines obtained for the planned level would not be used with a resultant increase in overhead and added pressure to increase rates even further. Under rate stabilization, a NIF activity can be reasonably assured that the planned level of production will be achieved because the customer will have the funds to pay for all approved services. NAVCOMPT noted that no ship overhauls are being deferred this fiscal year as evidence of this benefit. [Ref 20]

One problem that rate stabilization has generated for NAVCOMPT is that adjustments to an activity-level budget continues for several months at the Congressional and DoD level, resulting in potential changes in planned programs. Accordingly, close coordination is required between OSD, NAVCOMPT, Major Claimants, NIF customers and NIF activities during this period. [Ref 20]

D. IMPACT ON THE NAVAL FACILITIES ENGINEERING COMMAND

Of principal concern to NAVFAC is the previously

mentioned uniform pay back of gains or losses. Under this concept a gain generated by a particular PWC will not be returned to the customers who provided the gain. It will be returned to all PWC customers around the world. This is not fair to the customer who has realized a loss in the purchasing power of his budgeted dollars. The customer must be allowed to recoup his loss by having the entire contributed gain returned, not just one eighth of it. However, the biggest fault NAVFAC perceives in uniform payback is the detrimental impact on management incentives as previously discussed. [Ref 21]

NAVFAC is also concerned about the motivational impact on its PWC managers. A feeling of hopelessness may be the result of being locked in for three years. In other words, a management decision now could wait three years before it is proved or disproved. The PWC manager perceives no immediate realizable benefit from rate stabilization. [Ref 21]

Another distraction of rate stabilization is that if a gain is generated during a year there is no immediate way to return that gain. That has to wait for two more years, which hampers relations with PWC customers. [Ref 21]

NAVFAC recognizes the need to be conservative in rate estimation. The rapid turnover in the corpus (20 to 50 times a year) by the PWC's requires that they minimize the possibility of a loss. [Ref 21,23]

NAVFAC also expressed concern that rate stabilization might destroy the economics of the NIF way of doing business. For many years the Navy has asked its NIF managers to work toward zero profit and live within their small corpus. It is felt that rate stabilization might erode the management principles that have been so carefully

built up to achieve this goal.

On the positive side, NAVFAC feels rate stabilization will improve its managers by making them look much more closely at the market demand for their services. While this was addressed prior to rate stabilization, it was among the last factors considered when formulating budget estimates. Now it must be of primary interest. By so doing, better service should result because the PWC will be more familiar with customer needs. [Ref 21,24]

E. IMPACT ON PUBLIC WORKS CENTER, SAN DIEGO

To the PWC, rate stabilization provides for improved customer relations. The customer knows that with rates constant, one variable is eliminated. [Ref 23]

All levels of PWC management believe rate stabilization is a better way of doing business but they are especially concerned with the difficulties in predicting utility rates, because this is predicated on a number of primary factors over which the PWC has no control. [Ref 23]

One disturbing aspect of operating with stabilized rates and a small corpus is the advent of unpredicted requirements after rates have been set. Almost any requirement added or subtracted from the planned operation will cause a gain or loss to be generated. A loss means a strain on the corpus while a gain means bad publicity. This especially hurts PWC operations as opposed to shipyards or NARF's, because the workload is much less structured and the number of customers many times greater. [Ref 23]

Rate stabilization has caused a definite change in the

way PWC San Diego does business. The necessity of better long range planning is paramount. As a result, more overall PWC policy and guidance is imposed on department heads to aid in planning and budgeting. Prior to rate stabilization, a departmental head did not have to consider overall PWC policy until it actually affected him since he could adjust his rates if the policy dictated this to be necessary. [Ref 24]

The Comptroller organization at PWCSD is strongly in favor of rate stabilization and has already identified a reduction in overhead costs of about one half million dollars for FY 77 as a result of more intensive management review of overhead expense accounts. This reduction is directly attributable to the effects of rate stabilization. [Ref 24]

Even though the detrimental management aspects of uniform payback by the activity group did not personally bother the PWCSD Comptroller, a significant problem was uncovered when discussing this subject. This evolved around the administrative burden created by uniform payback. NAVFAC will have to expedite its analysis of gains and losses from all eight PWC's and effect proper distribution back to centers in time for them to get their rates to the customers for use in budget preparation. [Ref 24]

F. PWC CUSTOMER IMPACT

Extensive interviews at many customer activities point out the fact that for the most part the customer does not know what is the real benefit of rate stabilization. They do realize that budgeting has been made easier because costs are now a constant. What is not comprehended, is the

opportunity to achieve full funding for PWC services, since their major claimants receive these funds on the basis of the NIF A-11 Budget. Therefore, if the customer input to the PWC is an accurate reflection of his needs and this requirement is carried forward in the A-11 Budget, then upon approval of the budget there should be no reason for a customer to be faced with a fund shortage for PWC services. This failure to comprehend the true benefit of rate stabilization occurs because the major claimants present an image of level funding. As long as this image persists, the customer uses rate stabilization only to determine how much of a certain service he can have accomplished and not for overall planning and budgeting. Unless this image of level funding is erased, the concept of rate stabilization will not be fully utilized. [Ref 27 through 32]

Also apparent in the course of the interviews was the fact that the customers relied almost entirely on PWC historical records to prepare their own budgets. This confirms that the PWC budget is an excellent surrogate in this study for the customers budget.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS IN GENERAL

1. The concern expressed by many of those interviewed that the integrity of the NIF management is jeopardized by rate stabilization is unfounded. The principles of rate stabilization are similar to those principles governing the operations of a regulated utility or transportation company which cannot adjust its rates without the approval of a public commission. In time, it is expected that all NIF managers will adjust to this concept and rate stabilization will become the routine and accepted method of business.

B. CONCLUSIONS RELATED TO PWC'S

1. Rate stabilization is an effective management and budgeting tool for Public Works Centers and their customer activities.

2. Fiscal planning emphasis within PWC's must adapt from short term to a three year horizon.

3. More emphasis in the form of strong leaders, knowledgable people and close management attention must be assigned to the fiscal planning responsibilities in the

PWC's.

4. The costs the PWC's use in estimating rates for the budget years are generally overestimated, leading to conservative figures most likely to produce a gain to the corpus.

5. Under rate stabilization, end-of-year operating gains will probably be viewed more favorably by higher authorities than operating losses. Although understandable, this is contrary to the objectives of NIF management and rate stabilization and will result in loss of some purchasing power by the over-charged customer.

C. CONCLUSIONS RELATED TO CUSTOMERS

1. Rate stabilization did not improve the customers' ability to estimate quantities of resources required for a given budget period. Figure 1 indicated that with or without rate stabilization, the ranges of quantity planning variances were similar.

2. Rate stabilization has accomplished the objective of enabling the activity to more effectively manage funds by establishing a constant, direct relationship between quantities of resources consumed and costs. Figure 1 indicated that this direct relationship existed after rate stabilization, but not before.

3. Customer activities continue to receive budget guidance in the image of "level funding." Rate

stabilization, to date, has therefore not helped the customer activities to obtain funding levels to meet increased costs.

4. The image of level funding violates the spirit of the rate stabilization concept and negates any budgeting benefits attributable to rate stabilization.

D. RECOMMENDATIONS

1. Eliminate the system of uniform payback of gains and losses and require each NIF activity to stand on its own merits. This will strengthen the incentive of local NIF managers to more effectively manage toward their operating plan.

2. Implement strict budgeting procedures through major claimants to insure that funds identified to rate stabilized functions are passed correctly to the ultimate customer so that he is able to fund his planned programs.

APPENDIX A

BUDGET EFFECTIVENESS INDEX

A. INTRODUCTION

While Chapter III addressed the budgetary implications of the rate stabilization program, it only presented a 'micro' view, or category by category evaluation. Chapter III identified the purpose of rate stabilization as customer oriented: to permit the customer to execute the plan developed in the budgeting phase. It further pointed out the two-fold dilemma to that problem:

1. The customer must be able to accurately predict his resource requirements. Included in this is the ability to develop an effective plan for execution.

2. The customer must be able to accurately cost out his predicted requirements, to ensure proper funds are budgeted.

This appendix draws the data together for a 'macro' answer to the question: Does the rate stabilization program enable the customer activities to budget more effectively? The answer to this question is provided in a single figure which represents the percentage of deviation that actual results were of budgeted figures. Both aspects of the question above are considered in the development of the 'effectiveness index'.

B. UTILITIES AS A SURROGATE

This appendix, as does Chapter III, uses the utilities portion of the budget for its analysis, as that portion exhibits a measurability in units and cost per unit, both in the budgeting and in the execution phases. Further, the generalization is made that the utilities is sufficiently representative of the overall PWC funds that the effectiveness index developed represents the aggregated customers' budgets for PWC related areas. Chapter III developed rationale supporting this generalization; additional rationale is provided below:

1. Measurability

Not only are the utility requirements programmed in discrete, measurable units, but these requirements may be estimated by proven techniques. A building of a certain type construction and of a certain number of square feet will require so much energy to heat and cool it. Using factors such as fleet size and programmed fleet operations, an estimate of power requirements to ships in port may be determined. Further, overall base loading, age of buildings, etc. will permit a sound estimate of all utility requirements.

2. Controllability

Basically, the expenditure of utilities is relatively uncontrollable. By contrast, the other categories considered (overhaul, repair, renovation and

transportation) are more controllable than utilities. Decisions may be made by a command that, in order to reduce expenditures (or to stay within budget), less planned maintenance will be performed in a given year. The requirement does not disappear, but gets backed into subsequent years. On the other hand, a rational decision cannot be made to not use a kilowatt hour of electricity.

Numerous other factors affect the consumption of utilities, but by and large, these are beyond the control of the customer.

A. Weather

It may be possible to predict nature, but it cannot yet be controlled. The study of PWC San Diego almost minimizes this factor, as its climate is one of the most stable of any area in the United States. However, deviations from established weather patterns will directly affect the consumption of energy needed for heating or cooling. The current west coast drought condition further affects the need for fresh water. As these natural phenomena occur, there is little a customer can do but react by heating or cooling, or watering as conditions necessitate.

B. Costs

Utilities are state controlled monopolies, prices are approved (dictated) by Public Utilities Commissions. Energy costs (heat, electricity) directly reflect the tremendous increase in petroleum costs. Customers (and PWC's) cannot control costs by shopping around. The only alternative is self production, as PWC San Diego does with steam. However, costs of raw materials still directly impact the price of output. Since the O&M

appropriations are a fixed amount, variances which occur in utility costs must be absorbed by other O&M budgeted categories.

C. Conservation

Conservation conscious commands have been able to reduce their utility consumption rate. However, the direct results of conservation are not seen by the fellow who adjusts the thermostat or turns the lights off or on, but by the fellow who pays the bill. Utility conservation programs often grow old quickly as people become tired of being cold or hot, or working in darkness. Further, any reductions achieved by conservation measures are ultimately incorporated in the estimating formulas, so a few years later, budget estimates directly incorporate them and any 'savings' effect is negated.

3. Percentage of Overall Budget

The utilities are a significant portion of the overall PWC services to customers. In the years analyzed, utilities comprised the following proportions of overall PWC budget:

FISCAL YEAR	UTILITIES	TOTAL BUDGET	PERCENTAGE
1975	$14,732,600	$52,713,090	27.9%
1976	18,170,500	61,610,413	29.5%
197T	4,782,235	16,823,795	28.4%
1977	45,262,850	98,815,509	45.8%

The significant increase in FY 77 was due to the radical change in AC electricity rates.

C. THE EFFECTIVENESS INDEX

The effectiveness index represents the percentage of deviation that end-of-year results are of the planned/budgeted figures. It reflects both quantity planning estimates and budgeted dollars. In order to develop one such figure, a relationship must be developed between budgeted and actual results, between quantities and costs and among the various utility services.

1. Quantity to Dollars

While the objective of the rate stabilization program is to permit the customer to execute his plan, it cannot be done without adequate funding. Quantity planning figures represent an activity's best estimate of its consumption for the year. The amount of dollars budgeted, however, reflects not only costs of the estimated consumption, but dollar ceilings imposed by higher authorities. Further, while no direct ramifications occur if an activity consumes more than estimated, over-obligation of funds results in an R. S. 3679 violation. With these considerations in mind, an arbitrary weighting of 40% is assigned to the quantity factor and 60% is assigned to the funds analysis. After the analysis is performed and the index is generated, an uncertainty analysis is performed to test the validity of the assumption.

2. Between Budgeted and Actual Results

Both the quantities and the funds are analyzed as in Chapter III. The factor developed is a ratio of the difference between the budgeted and actual to the budgeted

figures. As presented in Chapter III, this ratio does not consider whether the actual results are more or less than the budgeted amount, but rather how closely the results approximated the budget. Therefore, the smaller the ratio, the closer the results are to the budgeted figures. In the equation a 'Q' represents the quantity factor, an 'F' represents the funding factor.

3. Among the Various Utility Services

Since the final figure represents the entire utilities budget, each utility service is weighted according to its relative proportion of the total utilities budget. While Chapter III displays the average percentage each service was of the total utilities budgets for FY 75, FY 76 and FY 7T, this appendix considers each year separately. Further, since it is impossible to evaluate BTU's of steam to kilowatt hours of electricity, or to gallons of water, the proportion that the budgeted dollars for each service are to the total utilities budget will be used as the weighting factor. For example, in FY 75, the amount budgeted for steam was $3,965,000 of a total budget of $14,732,600 for a weight of .270. A 'W' represents the weighting factor in the equation.

4. The Index Equation

Using the foregoing factors, a relationship for each fiscal year is developed. The final sum is multiplied by 100 to convert to a percentage figure:

$$\text{Effectiveness Index} = 100 \quad (.4Q + .6F) \quad W$$

$$\text{where} \quad Q = \frac{|\text{budgeted quantity} - \text{actual quantity}|}{\text{budgeted quantity}}$$

$$\text{and} \quad F = \frac{|\text{budgeted funds} - \text{actual funds expended}|}{\text{budgeted funds}}$$

In this equation, the lower the Index, the closer the actual results are to the budgeted estimates.

5. Analysis

Figures 3, 4 and 5 display all the pertinent data for FY 75, FY 76 and FY 7T respectively. Based upon that data, the effectiveness index, computed for each year, is displayed below:

EFFECTIVENESS INDEX (Percentage of Deviation That Actual Results were of Budget)

FY 75 = 6.47%
FY 76 = 10.94% (rate stabilized)
FY 7T = 2.20% (rate stabilized)

FY 77 was not analyzed, due to the inability to identify specific quantities projected through the first six months.

As in Chapter III, no specific conclusion is presented. Considering that FY 76 was the first year of implementation of rate stabilization, the results are interpreted as being not extremely out of line. From FY 7T

results, however, it appears that rate stabilization is providing an improvement in the customers' budgeting abilities.

6. Uncertainty Analysis

Drafted with the proportions the way they are, the Effectiveness Index slightly favors the non-rate stabilized data, since the weighting factor 'W' is based on dollars and not output quantities. Further, the proportion between 'Q' and 'F' favors the funds ratio, 'F', by 20%. To test the stability of the Index, it is computed using different ratios of Q to F, and is presented below:

YEAR	Q:F 40:60	Q:F 80:20	Q:F 100:0
1975	6.40%	8.01%	8.80%
1976	10.94%	11.03%	11.07%
197T	2.20%	2.24%	2.55%

The above results show that by varying the importance of the output criteria, Q, the Index for rate stabilized years shows only minimal increases, while the non-stabilized year jumps by over one-third. This is interpreted that rate stabilization, oriented at customer program accomplishment vice budget constraints, was successful toward that end. This statement, however must be cushioned as it is based on PWC data as a substitute for customer data. The problems identified in Chapter IV related to the individual customers' inability to really predict requirements is still an uncertainty in this analysis.

D. SUMMARY

The analysis of FY 75 performance predictably shows good results, since the PWC has the experience of operating that way for many years. The interesting aspect is that, in FY 76, with the first try, not only did rate stabilization show good results, but came close to FY 75 performance. As an added indication that this was no fluke, FY 7T's results were better that FY 75's, albeit only for a three month period. Analysis of the entire FY 77 data should prove that, at worst, rate stabilization budgeting is as good as pre-rate stabilization. Therefore, given the wide spectrum of management benefits accruing from rate stabilization, it should be approved for continued use.

		UNITS			DOLLARS			
UTILITY SERVICE	UNIT	BUDGETED	ACTUAL	'Q'	BUDGETED	ACTUAL	'F'	'W'
Electricity (AC)	MKWH	276,000	301,932	.082	$7,797,000	$7,922,990	.016	.529
Steam	MBTU	1,300,000	1,220,811	.061	3,965,000	3,432,066	.091	.270
Water (Fresh)	MGAL	1,350,000	1,493,755	.016	1,026,000	1,064,764	.038	.069
Sewage Disposal	MGAL	810,000	872,978	.078	526,500	498,990	.052	.036
Small Heat Plants	MBTU	94,000	111,467	.186	531,100	616,081	.160	.036
Gas	MCF	145,000	130,024	.103	253,750	222,851	.122	.017
Compressed Air	MCF	575,000	537,336	.066	264,500	236,089	.107	.018
Water (Salt)	MGAL	725,000	614,985	.152	181,250	153,755	.152	.012
Electricity (DC)	MKWH	3,000	2,948	.017	187,500	185,070	.013	.069
totals		N/A	N/A		$14,732,600	$14,403,857		1.000

Figure 3 - FY 75 BUDGET AND OPERATING DATA

		UNITS			DOLLARS			
UTILITY SERVICE	UNIT	BUDGETED	ACTUAL	'Q'	BUDGETED	ACTUAL	'F'	'W'
Electricity (AC)	MKWH	305,000	345,804	.134	$10,065,000	$11,353,544	.128	.554
Steam	MBTU	1,330,000	1,299,481	.023	4,522,000	4,390,300	.029	.249
Water (Fresh)	MGAL	1,562,000	1,922,481	.231	1,405,800	1,702,881	.211	.077
Sewage Disposal	MGAL	862,000	1,073,105	.245	560,300	692,744	.236	.031
Small Heat Plants	MBTU	98,000	96,813	.012	563,500	542,688	.037	.031
Gas	MCF	165,000	147,930	.103	346,500	304,230	.122	.019
Compressed Air	MCF	590,000	586,419	.006	295,000	289,358	.019	.016
Water (Salt)	MGAL	670,000	588,940	.121	214,400	188,459	.121	.012
Electricity (DC)	MKWH	3,000	2,560	.147	198,000	168,921	.147	.011
totals		N/A	N/A		$18,170,500	$19,633,125		1.000

Figure 4 - FY 76 BUDGET AND OPERATING DATA

	UNITS				DOLLARS			
UTILITY SERVICE	UNIT	BUDGETED	ACTUAL	'Q'	BUDGETED	ACTUAL	'F'	'W'
Electricity (AC)	MKWH	90,000	90,797	.009	$2,970,000	$2,981,587	.004	.621
Steam	MBTU	251,000	250,770	.001	853,400	850,604	.003	.178
Water (Fresh)	MGAL	560,000	594,140	.061	504,000	519,842	.031	.105
Sewage Disposal	MGAL	310,000	330,294	.065	210,500	213,616	.060	.042
Small Heat Plants	MBTU	12,500	12,439	.005	71,875	70,319	.022	.015
Gas	MCF	25,000	21,341	.146	52,500	43,392	.173	.011
Compressed Air	MCF	110,000	175,785	.598	55,000	87,337	.588	.012
Water (Salt)	MGAL	128,000	107,796	.158	40,960	34,494	.158	.009
Electricity (DC)	MKWH	500	524	.048	33,000	34,571	.048	.007
totals		N/A	N/A		$4,782,235	$4,835,762		1.000

Figure 5 - FY 7T BUDGET AND OPERATING DATA

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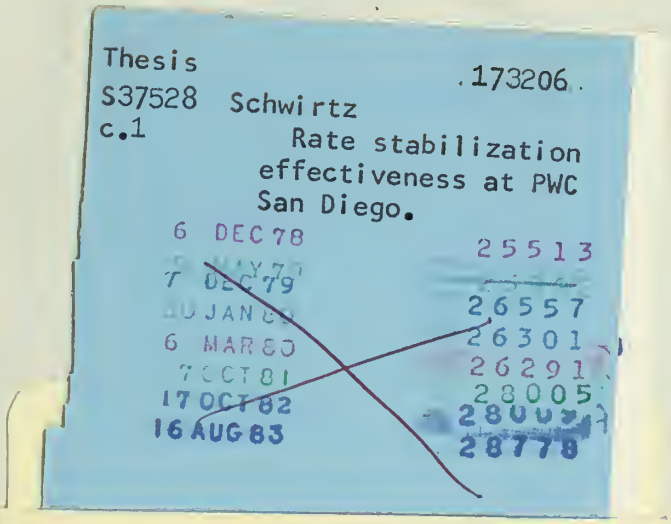
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